

CLAIMS:

What we claim is:

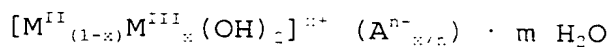
1. Process for preparing an anion-exchanging mineral by precipitating
 - of at least one metal salt from the group:
 Ca^{2+} , Mg^{2+} , Fe^{2+} , Ni^{2+} , Zn^{2+} , Co^{2+} , Cu^{2+} , Mn^{2+} , Li^{+} ,
nitrate, sulfate, chloride or hydroxide
 - and at least one metal salt from the group Al^{3+} ,
 Fe^{3+} , Cr^{3+} , Mn^{3+} , nitrate, sulfate, chloride, or
hydroxide, from an essentially carbonate-free
aqueous alkaline solution, with the precipitation
reaction being carried out over an extended period,
 - separation of the precipitated product, and
 - heat-treating the precipitated product, i.e.,
carrying out a thermal treatment at up to 350 °C,
preferably up to 250 °C.
2. Process according to Claim 1, characterized in that the mineral obtained is further treated, after washing and drying, with acid and/or a phosphate solution.
3. Process according to Claims 1 or 2, characterized in that the pH of the solution is held constant, preferably at pH 12 ± 2.
4. Process according to one of Claims 1 to 3, characterized in that KOH is used as the base.
5. Process according to one of Claims 1 to 4, characterized in that the first group of metal salts comprises Ca^{2+} , Mg^{2+} , nitrate, and the second group of metal salts comprises Al^{3+} , Fe^{3+} , nitrate.

1 6. Process according to one of Claims 1 to 4, characterized
2 in that the first group of metal salts comprises Ca^{2+} , Mg^{2+} ,
3 sulfate, chloride and hydroxide, and the second group of
4 metal salts comprises Al^{3+} , Fe^{3+} , sulfate, chloride, and
5 hydroxide.

1 7. Use of anion-exchanging minerals which exchange NO_3^- , among
2 others, reversibly, particularly those prepared by a process
3 according to one of Claims 1 to 6, as a fertilizer or soil
4 improver for steady supply of nitrogen as nitrate to crop
5 soil.

1 8. Use according to Claim 7, characterized in that the
2 minerals are natural or synthetic mixed-valence basic metal
3 salts.

1 9. Use according to Claim 8, characterized in that the
2 minerals are essentially carbonate-free laminated double
3 hydroxides (LDHs) which contain exchangeably bound anions in
4 the intermediate layers and which can be represented by the
5 following formula:



8 in which

9 M^{II} is a bivalent metal ion such as Ca, Mg, Fe, Ni, Zn,
10 Co, Cu, Mn, or 2 Li, preferably Ca, Mg or Fe,

11 M^{III} is a trivalent metal ion, preferably Al, Fe, Cr or
12 Mn,

13 A^{n-} is a n-valent anion bound in the intermediate
14 layer, such as nitrate, sulfate, chloride or hydroxide.

1 10. Use according to one of Claims 7 to 9, characterized in
2 that when the natural or synthetic mineral is produced it

1 contains up to about 30% by weight, and preferably not less
2 than 5% by weight, nitrate ions.

1 11. Use according to one of Claims 7 to 10, characterized in
2 that it is used in combination with auxiliary materials and
3 additives.

1 12. Use according to one of Claims 7 to 11, characterized in
2 that an ordinary mixed fertilizer and optionally other
3 fertilizer additives, are added to the mineral.

1 13. Use according to one of Claims 7 to 12, characterized in
2 that the mineral is used in a preparation with seeds,
3 seedlings, or propagation material.

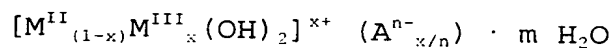
1 14. Use according to Claim 13, characterized in that the
2 propagation material, seeds, or seedlings in the preparation
3 are coated with the mineral and optionally with other
4 additives.

1 15. Use according to one of Claims 7 to 14, characterized in
2 that the mineral occurs in the preparation in liquid form,
3 such as an emulsion, gel or paste, or in solid form, such as
4 a powder, granulation or prills.

1 16. Use of anion-exchanging minerals which exchange NO_3^- ,
2 among others, reversibly, particularly prepared by a process
3 according to one of Claims 1 to 4 or 6, for purification and
4 treatment of waters, especially for removal of nitrate.

1 17. Use according to Claim 16, characterized in that the
2 minerals are natural or synthetic mixed-valence basic metal-
3 metal salts.

1 18. Use according to Claim 17, characterized in that the
2 minerals are in essentially carbonate-free laminate double
3 hydroxides (LDHs) which contain exchangeably bound anions in
4 the intermediate layers and which can be represented by the
5 following formula:



7 in which

8 M^{II} is a bivalent metal ion such as Ca, Mg, Fe, Ni, Zn,
9 Co, Cu, Mn, or 2 Li, preferably Ca, Mg or Fe,

10 M^{III} is a trivalent metal ion, preferably Al, Fe, Cr or
11 Mn,

12 A^{n-} is an anion bound in the intermediate layer, such
13 as sulfate or hydroxide and preferably chloride.